Description of *Haliotis fatui* new species (Gastropoda: Vetigastropoda) from the tropical western Pacific

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ABSTRACT

A new abalone species from the central Indo-Pacific is described. The species has been known for almost two decades and resulted in the introduction of a *nomen nudum*. The name is validated here as *Haliotis fatui* Geiger (*ex*-Rehder MS). The species is described from shell, radular, epipodial, and hypobranchial gland characters. It is most similar to and occurs in part of the range (Tonga, Solomon Islands, Vanuatu, and Marianas Islands) of the highly variable *Haliotis varia* Linnaeus, 1758. It differs from this latter species, however, in its shell and epipodial characters.

Key words: Abalone, Gastropoda, Haliotidae, *Haliotis fatui* new species, Indo-Pacific.

INTRODUCTION

Geiger (1998a) recently discussed all 200 species-level taxa and the 17 genus-level taxa in the family Haliotidae Rafinesque, 1815. Most temperate species are fairly well known; some tropical species, however, pose problems in respect to their alpha taxonomy. Geiger (1998b) discussed the controversial taxon *H. clathrata* Lichtenstein, 1794 (*non* Reeve, 1846), for which Geiger and Stewart (1998) formulated Case 3036 now pending with the *International Commission on Zoological Nomenclature*. Stewart and Geiger (1999) designated a lectotype for *H. crebrisculpta* Sowerby, 1914, with a discussion on *H. clathrata* Reeve, 1846. Geiger and Groves (in press) review the fossil taxa including the few records from tropical regions. The study of tropical abalone is continued here with the introduction of a new species that has been known for almost two decades. A *nomen nudum* had been introduced twice for this species under the epithet "*fatui* Rehder" (Anon., 1981) and "*fatui* Rheder [*sic*], 1981?" (Ubaldi, 1993). Herein I clarify the systematics of this species and validate the name.

MATERIAL AND METHODS

Depository collections: AMNH, American Museum of Natural History, New York; ANSP, Academy of Natural Sciences, Philadelphia; MHNG, Muséum d'Histoire Naturelle, Genève; USNM, National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Study of animals: Radula and epipodium were prepared as detailed in Geiger (1996) and Stewart and Geiger (1999). The terminology of radula parts of Hickman (1981) and Geiger (1996) is adopted.

SYSTEMATICS

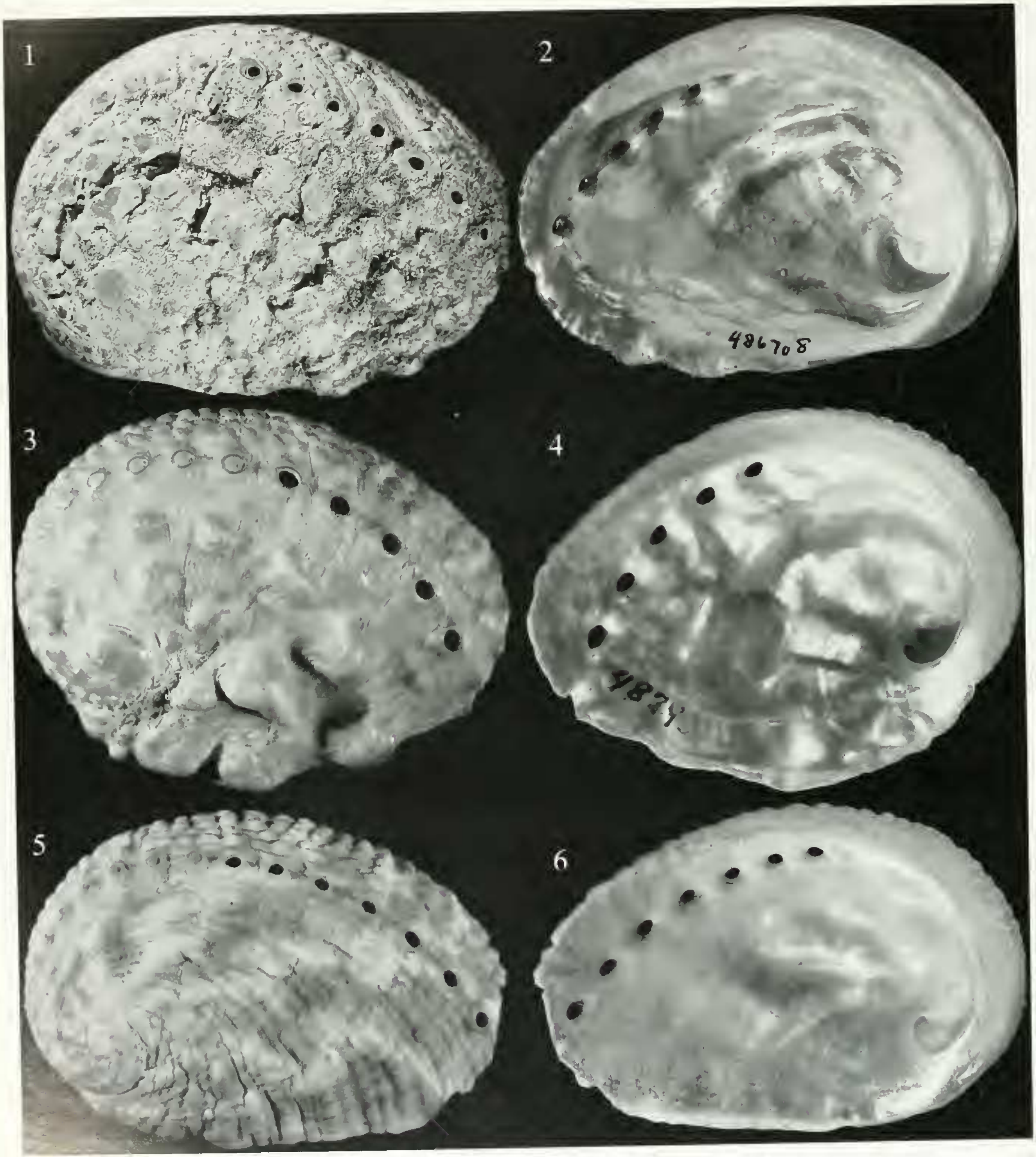
Order Vetigastropoda Salvini-Plawén, 1980
Family Haliotidae Rafinesque, 1815
Genus *Haliotis* Linnaeus, 1758

Remarks: As discussed by Geiger (1996, 1998a), there is currently no justification to subdivide the genus *Haliotis sensu lato* into subgenera. Accordingly, the species described here is placed in that large genus. Further study of the family may eventually identify distinct clades worthy of taxonomic recognition, but this stage has not yet been reached.

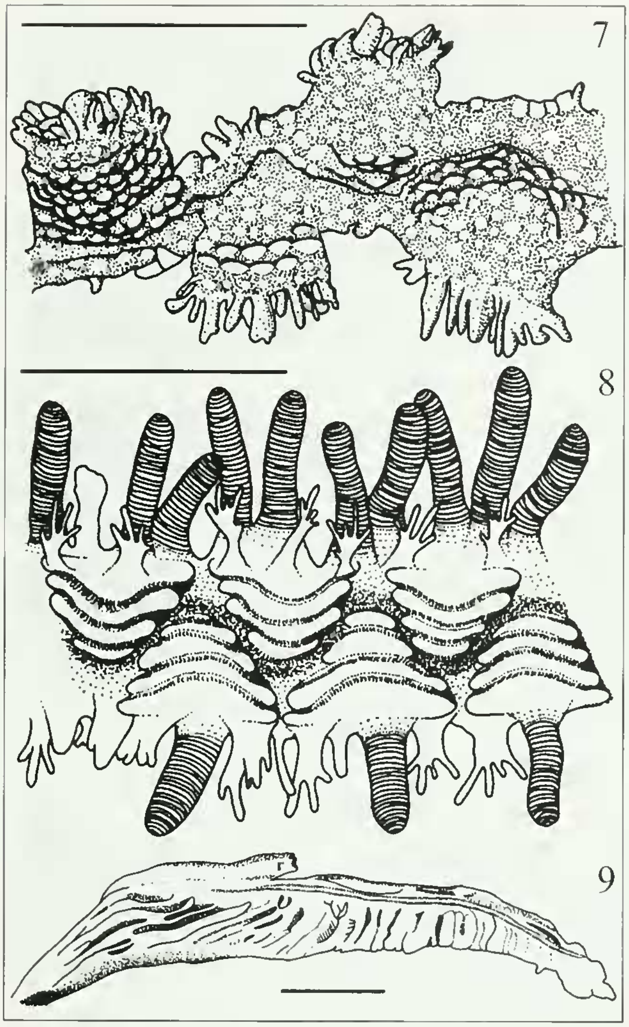
Haliotis fatui Geiger new species
(Figures 1–7, 9–16)

H. varia subspecies—Kaicher (1981: card no. 2902).
H. spiculata fatui Rehder—Anon.(1981:7) (*nomen nudum*).
H. fatui Rheder [*sic*], 1981?—Ubaldi (1993:H 3–1) (*nomen nudum*).

Description (diagnostic characters underlined): Shell medium size (to 6 cm), medium weight, somewhat arched, sub-circular to oval-oblong; strong, knobby bumps on dorsal surface of shell, usually in few, distinct, spiral rows, occasionally also in prosocline rays. Spiral threads strong, coarsely granulated. Periphery between row of holes and columella in smooth transition to dorsal surface. Holes, small, round, slightly raised. Color muddy green, brown, yellow brown. Color pattern irregular to blotchy, no spiral elements, no prosocline rays. Columella of medium width. Nacre light steel-gray. Muscle scar absent in small specimens, present in some large specimens, composed of fine, irregularly concentric ac-



Figures 1–6. Shells of *Haliotis fatui* new species. **1, 2.** Holotype, USNM 486708, 46.6 mm, Mang Island. **3, 4.** Paratype, USNM 487953, 29.5 mm, Tonga. **5, 6.** Paratype, MHNG 21226, 42.3 mm, Vanuatu. Note the variability in the extent of the bumps on the dorsal surface of the shell, and the equally variable strength of the spiral cords. The tremata are generally rather small for the genus but note the differences between 1 and 5 as compared to 3.



Figures 7–9. Soft parts of *Haliotis fatui* new species, and *H. varia* Linnaeus, 1758. **7, 8.** Epipodia with dorsal side toward top of page. Semi-schematic, reconstructed drawings from camera lucida tracings. **7.** *Haliotis fatui*, holotype, USNM 486708. Scale bar = 5 mm. **8.** *Haliotis varia*, DLG unnumbered, Sengiggi, Lompok, Indonesia, leg. T. Baer, shell length = 27 mm. Scale bar = 2 mm. **9.** Hypobranchial gland of *H. fatui*, holotype, USNM 486708. Viewed from anterior to right side. Scale bar = 5 mm. r = rectum.

cretion lines (pathological feature?). Spire visible in ventral view.

Epipodium (Figure 7) of medium width, dorso-ventrally symmetrical, with undulating mid-epipodial fold. Face covered with low, warty tubercles, larger elements alternating dorso-ventrally. Fringe with irregular lobes, secondary short projections, denser on large elements, few between them. No hand-shaped structures, no dorsal or ventral tentacles.

Hypobranchial gland simple (Figure 9), neither secondary lamellae of the northeastern Pacific species, nor the thick lamellae of *H. asinina* (Geiger, unpubl. data).

Radula (Figure 10) slightly asymmetrical, skewed to left side. Rachidian tooth (Figure 11) somewhat narrower than first lateral tooth; cutting edge not thickened, postero-basal projection absent. Lateral tooth 1 (Figure 11) with straight primary ridge (pr), secondary ridge (sr) much smaller than primary. Lateral teeth 3–5 (Figure 12) without denticles. Marginal teeth (Figures 13–15) symmetrically denticulated.

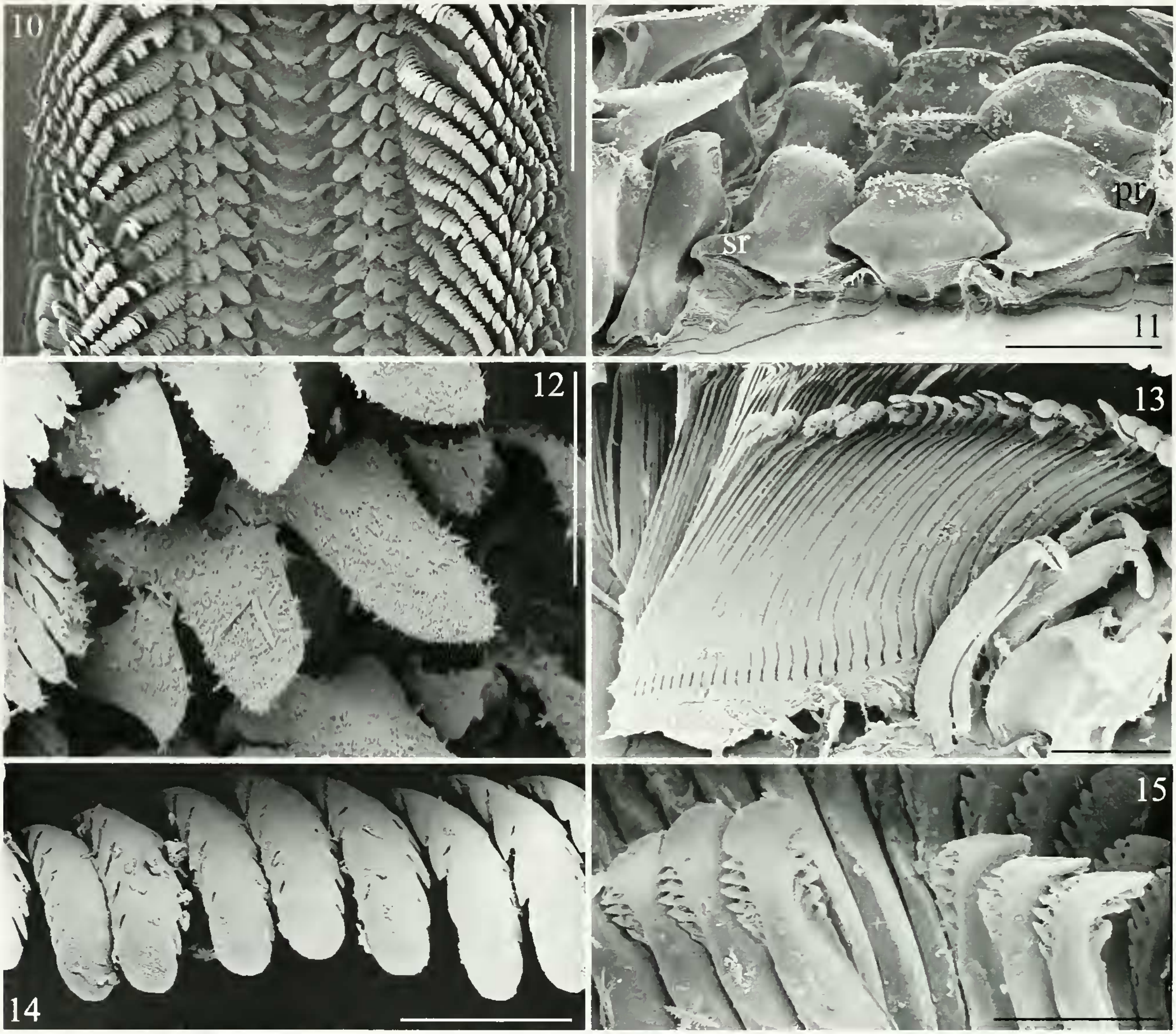
Type material: Holotype, USNM 486708, shell with animal, radula mounted on stub, desiccated and mounted piece of epipodium: Mang Island, N Marianas, 1945, leg. Banner, 46.6 mm (Figures 1–2, 7, 9–15). Paratypes, AMNH 81878, 1 shell, Santa Ana Island, Solomon Islands, Whitney South Seas Expedition 1929–1930, 58.9 mm; AMNH 81899, 1 shell, Santa Ana Island, Solomon Islands, Whitney South Seas Expedition 1929–1930, Jan. 1930, 53 mm; ANSP 284325, 1 shell, Kumbun Island, SW New Britain, ex. coll. W. E. Jamison, Nov. 1962, 40 mm; MHNG 21226, 1 shell, Vanuatu, leg. de Villoutreys, 42.3 mm (Figures 5–6); USNM 702975, 7 shells, NE Tofua Island, Ha'apai Group, Tonga, April 1971, on coral rocks off reef edge, leg. John H. Fatu, 29.3 mm, 36.4 mm, 40.4 mm, 42.2 mm, 46.9 mm, 49.2 mm, 52.7mm; USNM 702512, 9 shells, reef off Tofua Island, Tonga, April 1971, ex-L. J. Lancaster, 34 mm, 37.2 mm, 37.4 mm, 44.0 mm, 43.5 mm, 48.2 mm, 50.7 mm, 58.0 mm; 50.2 mm; USNM 487953, 1 shell, Agrigan Island, N Marianas, 29.5 mm (Figures 4–5); USNM unnumbered, 1 shell, Tonga, 53.1 mm; USNM unnumbered (ex-San Diego Society of Natural History No. 32719), 2 shells, Tonga Island, Vavau, leg.H. N. Lowe, 1924, 48.9 mm, 46.5 mm.

Type locality: Mang Island, Northern Marianas.

Distribution (Figure 16): Most specimens have been found on Tonga, with additional specimens stemming from the Solomon Islands, Vanuatu, and the Marianas Islands. An overall western-central Indo-Pacific distribution pattern seems to be emerging. From the little information available, the species seems to live in shallow coral reef habitats, which is typical for tropical abalone species (Geiger, 1996; Stewart & Geiger, 1999).

Etymology: The name honors the collector of several specimens from Tonga, John H. Fatu. The provisional name that has been associated with this species is validated, following the original intent of the late Dr. H. A. Rehder of the USNM.

Comparative remarks: The only species similar to *H. fatui* is *H. varia* Linnaeus, 1758. *Haliotis varia* is an extremely variable species and it is likely that some specimens will not be separable from shell morphology alone. The comparison provided here is between a typical *H. fatui* and a typical *H. varia*, i.e., the well-known green form of the latter species from the Philippine Islands. In *H. varia* the shell is more arched, usually heavier, and the knobs are more weakly developed than in *H. fatui*. The apertural lip is more outwardly curved in *H. varia*. The holes in *H. fatui* tend to be smaller and more numerous, although this last character is extremely var-



Figures 10–15. Radula of *Haliotis fatui* new species, holotype, USNM 486708. The crystalline precipitations are preparational artifacts of unknown origin. **10.** View of entire radula from anterior third of ribbon. Note slight asymmetry. Scale bar = 1 mm. **11.** Rachidian and lateral tooth 1. pr: primary ridge. sr: secondary ridge. Scale bar = 200 μm. **12.** Lateral teeth 3–5 without denticles. Scale bar = 200 μm. **13.** Face of entire left row of marginal teeth in posterior view. Larger and stronger teeth to the right are from a more inner position of the preceding row than the more slender teeth to the left. Scale bar = 200 μm. **14, 15.** Cusps of inner marginal teeth. Note symmetrical denticles.**14.** Dorsal view. Scale bar = 100 μm. **15.** Ventral view. Scale bar = 100 μm.

iable (Geiger and Groves, in press) within species. The coloration of *H. varia* consists typically of some oblique, prosocline, jagged flammules, in green tones, whereas in *H. fatui*, the distribution of pigment is rather blotchy with green and brown specimens being equally represented.

The epipodium of *H. fatui* is devoid of dorsal or ventral tentacles (Figure 7), whereas these are prominent in *H. varia* (Figure 8). Both species share alternating larger elements, but this character is also shared with a number of other abalone species. The presence of hand-shaped elements in *H. varia*, as seen in *H. unilateralis* Lamarck, 1822, and *H. clathrata* Reeve (Geiger, 1996; Stewart and Geiger, 1999), distinguishes *H. varia* from *H. fatui*. The radula of the two species are very similar to each other, as well as to other tropical species such as *H. unilateralis* (see Geiger, 1996), *H. clathrata* Reeve (see Stewart & Geiger, 1999), and *H. asinina* Linnaeus, 1758, and *H. ovina* Gmelin,1791 (see Chitramvong *et al.*, 1998). Chitramvong *et al.* (1998) noted strong differences for lateral teeth 1 and 2 based on their fig. 3C. However, their fig. 3C does not agree with their figs 3A, 3B, and 3D, which show a very different and very typical lateral tooth 1. Overall, these results corroborate indications that radular characters better define taxa above the species level (Geiger, unpublished data).

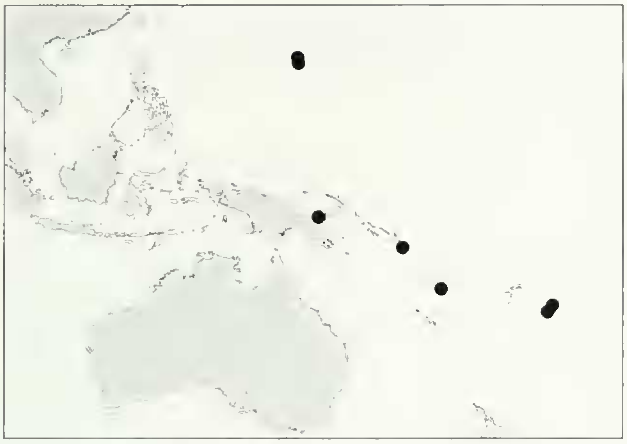


Figure 16. Map showing distribution of *Haliotis fatui* new species.

Remarks: Kaicher (1981: card no. 2902) illustrated specimens of this species. Anon. (1981), and Ubaldi (1993), both mentioned the taxon as *nomina nuda* as discussed by Geiger (1998a: note 71). The mention by Anon. (1981:7) of "*Haliotis spiculata* Reeve, 1846" actually refers to *H. sepiculata* Reeve, 1846, one of the many synonyms of *H. varia* (see Geiger, 1998a). Although most material available originates from Tonga, the Marianas Islands specimen is chosen as the holotype, because it is the sole specimen with the animal. The distribution of *H. varia* circumscribes that of *H. fatui*; hence, I do not consider *H. fatui* a subspecies of *H. varia* (cf. Kaicher, 1981), because sympatric subspecies by definition do not exist.

The specimen from USNM 702512 measuring 50.2 mm had been separated from the main lot by Rehder for designation as primary type; a handwritten label "Holotype" accompanied the specimen. This original intention of Rehder is here overridden.

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